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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/607,154	06/27/2003	Koichiro Nakatani	116377	5176
25944	7590	11/16/2004	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			NGUYEN, TU MINH	
			ART UNIT	PAPER NUMBER

3748

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/607,154

Applicant(s)

NAKATANI ET AL.

Examiner

Tu M. Nguyen

Art Unit

3748

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 11-22, 25 and 27-32 is/are rejected.
- 7) ☒ Claim(s) 5-10, 23, 24 and 26 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 062703.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 11-21, 25, and 27-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Molinier (U.S. Patent 6,758,036) in view of Takahashi et al. (U.S. Patent 6,679,050).

Re claims 1, 18, and 19, as shown in Figure 6, Molinier disclose a device for purifying exhaust gas for an engine having an exhaust passage, the engine being operated with a lean air-fuel ratio, the device comprising:

- a SOx storage (3) arranged in the exhaust passage for temporarily storing SOx contained in an exhaust gas inflowing therein;
- an auxiliary catalyst (5) arranged in the exhaust passage downstream of the SOx storage, the auxiliary catalyst having an oxidizing ability;
- SOx discharging means (2A, 2B) for discharging SOx stored in the SOx storage therefrom; and
- atmosphere control means (4, 9) for controlling an atmosphere of the auxiliary catalyst,

wherein discharge of SO_x stored in the SO_x storage therefrom is prevented or suppressed when the auxiliary catalyst is in, or is turned to, a sulfate forming atmosphere in which an amount of a reducing agent contained in the exhaust gas flowing to the auxiliary catalyst is smaller than an allowable minimum amount (i.e., when an air-fuel ratio of the exhaust gas at the auxiliary catalyst is lean or less than stoichiometry) (according to the Abstract, a regeneration of the SO_x storage (3) is suppressed until a rich environment is established at the auxiliary catalyst (5)); and

wherein, when SO_x stored in the SO_x storage is discharged therefrom with the atmosphere of the auxiliary catalyst being in a sulfate forming atmosphere in which an amount of a reducing agent contained in the exhaust gas flowing to the auxiliary catalyst is smaller than an allowable minimum amount, the atmosphere of the auxiliary catalyst is changed to an atmosphere (rich) other than the sulfate forming atmosphere (lean), and when SO_x stored in the SO_x storage is discharged therefrom with the atmosphere of the auxiliary catalyst being in an atmosphere other than the sulfate forming atmosphere, the atmosphere of the auxiliary catalyst is maintained at an atmosphere (rich) other than the sulfate forming atmosphere (also see lines 34-40 of column 2 and line 61 of column 5 to line 6 of column 6).

Molinier, however, fails to disclose that in a sulfate forming atmosphere, a temperature of the auxiliary catalyst is higher than an allowable maximum temperature.

As shown in Figure 1, Takahashi et al. teach an exhaust emission control device for an engine, in which a sulfate forming atmosphere for a catalyst (9) is clearly defined. As indicated on lines 17-36 of column 5, the catalyst (9) only adsorbs SO_x during a lean air-fuel ratio

environment and adsorbs more SO_x when a temperature of the catalyst is higher than a predetermined temperature. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Takahashi et al. to recognize that during a sulfate forming atmosphere, a temperature of the auxiliary catalyst (5) in Molinier is higher than an allowable maximum temperature.

Re claims 2 and 20, the device of Molinier further comprises means (4, 9) for controlling the temperature of the auxiliary catalyst (5), wherein the temperature of the auxiliary catalyst is lowered to, or maintained at, a temperature which is not higher than the allowable maximum temperature, to change the atmosphere of the auxiliary catalyst to, or maintain the atmosphere of the auxiliary catalyst at an atmosphere other than the sulfate forming atmosphere.

Re claims 3 and 21, the device of Molinier further comprises means (4, 9) for controlling an amount of the reducing agent contained in the exhaust gas flowing to the auxiliary catalyst (5), wherein the amount of the reducing agent is increased to, or maintained at an amount which is not smaller than the allowable minimum amount, to change the atmosphere of the auxiliary catalyst to, or maintain the atmosphere of the auxiliary catalyst at, an atmosphere other than the sulfate forming atmosphere.

Re claims 11 and 25, in the device of Molinier, the temperature of the SO_x storage (3) is maintained at a temperature not lower than a SO_x amount reduction required temperature (a desorbed or discharged SO_x temperature) which is higher than the allowable maximum temperature while an air-fuel ratio of the exhaust gas flowing to the SO_x storage is maintained at a rich or stoichiometric air-fuel ratio, to discharge SO_x stored in the SO_x storage therefrom.

Re claims 12 and 27, in the device of Molinier, the SOx discharging means comprises means for obtaining an amount of SOx stored in the SOx storage, and SOx stored in the SOx storage is discharged therefrom when the amount of SOx stored in the SOx storage is larger than an allowable SOx amount (see Takahashi et al.: steps S105-S106).

Re claims 13 and 28, in the device of Molinier, the SOx storage (3) comprises a storage which stores SOx contained in the inflowing exhaust gas in a form of sulfate salt (lines 40-56 of column 3).

Re claims 14 and 29, in the device of Molinier, the SOx storage (3) comprises a storage (a precious metal) which stores SOx contained in the inflowing exhaust gas without forming sulfate salt (lines 31-39 of column 3).

Re claims 15 and 30, in the device of Molinier, the SOx storage (3) comprises a NOx catalyst which stores therein NOx contained in the inflowing exhaust gas when the air-fuel ratio of the inflowing exhaust gas is lean, and reduces NOx stored therein to reduce an amount of NOx stored therein when a reducing agent is contained in the inflowing exhaust gas and the air-fuel ratio of the inflowing exhaust gas is lowered (the SOx storage (3) also includes a NOx trap (lines 31-39 of column 3) which absorbs NOx in the exhaust gas when the inflowing exhaust gas is lean).

Re claims 16 and 31, in the device of Molinier, the auxiliary catalyst (8) includes precious metals such as platinum without including alkali metals, alkali earth metals, and rare earth metals.

Re claims 17 and 32, in the device of Molinier, the auxiliary catalyst (5) comprises a NO_x catalyst which stores therein NO_x contained in the inflowing exhaust gas when the air-fuel ratio of the inflowing exhaust gas is lean, and reducing NO_x stored therein to reduce an amount of NO_x stored therein when a reducing agent is contained in the inflowing exhaust gas and the air-fuel ratio of the inflowing exhaust gas is lowered.

3. Claims 4 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Molinier in view of Takahashi et al. as applied to claims 1 and 18, respectively, above, and further in view of Hirota et al. (U.S. Patent 5,974,791).

The device of Molinier discloses the invention as cited above, however, fails to disclose that the SO_x storage is carried on a particulate filter for collecting particulates contained in the inflowing exhaust gas.

As shown in Figure 1, Hirota et al. teach an exhaust gas purification device for an engine, comprising at least a DPF (10a) having an alkali metal and/or alkali earth metal (lines 59-64 of column 5 and lines 44-49 of column 6) to absorb SO_x in the exhaust gas. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the DPF taught by Hirota et al. in the device of Molinier, since the use thereof would have also eliminated harmful soot emission in the exhaust gas.

Allowable Subject Matter

4. Claims 5-10, 23, 24, and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Prior Art

5. The IDS (PTO-1449) filed on June 27, 2003 has been considered. An initialized copy is attached hereto.

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure and consists of six patents and three patent applications: Takeshima et al. (U.S. Patent 5,473,890), Araki et al. (U.S. Patent 5,850,735), Boegner et al. (U.S. Patent 6,119,450), Strehlau et al. (U.S. Patent 6,145,303), Gunther et al. (U.S. Patent 6,318,075), Boegner et al. (U.S. Patent 6,408,620), Bruggemann et al. (U.S. Patent Application 2002/0033017), Kitahara et al. (U.S. Patent Application 2003/0213235), and Schnaibel et al. (U.S. Patent Application 2004/0011028) further disclose a state of the art.

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Communication

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (703) 308-2833 or (571) 272-4862 to be effective on November 24, 2004.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (703) 308-2623 or (571) 272-4859 to be effective on November 24, 2004. The fax phone number for this group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-1148.

Tu M. Nguyen

TMN

November 14, 2004

Tu M. Nguyen

Patent Examiner

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